

ORIGINAL

DOCKET FILE COPY ORIGINAL

LATHAM & WATKINS

ATTORNEYS AT LAW

1001 PENNSYLVANIA AVE., N.W., SUITE 1300  
WASHINGTON, D.C. 20004-2505  
TELEPHONE (202) 637-2200  
FAX (202) 637-2201  
TLX 590775  
ELN 62793269

PAUL R. WATKINS (1899-1973)  
DANA LATHAM (1898-1974)

CHICAGO OFFICE  
SEARS TOWER, SUITE 5800  
CHICAGO, ILLINOIS 60606  
TELEPHONE (312) 876-7700  
FAX (312) 993-9767

LONDON OFFICE  
ONE ANGEL COURT  
LONDON EC2R 7HJ ENGLAND  
TELEPHONE + 44-71-374 4444  
FAX + 44-71-374 4460

LOS ANGELES OFFICE  
633 WEST FIFTH STREET, SUITE 4000  
LOS ANGELES, CALIFORNIA 90071-2007  
TELEPHONE (213) 485-1234  
FAX (213) 891-8763

MOSCOW OFFICE  
113/1 LENINSKY PROSPECT, SUITE C200  
MOSCOW 117198 RUSSIA  
TELEPHONE + 7-503 956-5555  
FAX + 7-503 956-5556

By Messenger

William F. Caton  
Acting Secretary  
Federal Communications Commission  
1919 M Street, NW  
Washington, DC 20554

Re: File No. 3-DSS-P/LA-94; 4-DSS-P/LA-94;  
CC Docket No. 92-297, RM-7872, RM-7722  
Ex Parte Presentation

Dear Mr. Caton:

Pursuant to Section 1.1204(b)(7) of the Commission's rules, Edward J. Fitzpatrick of Hughes Communications Galaxy, Inc., Andrew Strodbeck of Hughes Space and Communications Company and the undersigned representative of Hughes Communications Galaxy, Inc. met on July 6, 1995 with the following Commission representatives: Thomas S. Tycz, Donna Bethea, Harold Ng, and Karl A. Kensinger, to discuss the Spaceway system ground segment. We also discussed band segmentation proposals for the 28 GHz band. The enclosed materials formed the basis for those discussions.

An original and four copies of this letter are enclosed. The Commission's Public Notice DA 95-663, released April 5, 1995, waived the requirement that these materials be served on the parties to the restricted adjudicative proceeding involving applications in the 27.5-

NEW JERSEY OFFICE  
ONE NEWARK CENTER  
NEWARK, NEW JERSEY 07101-3174  
TELEPHONE (201) 639-1234  
FAX (201) 639-7298

NEW YORK OFFICE  
885 THIRD AVENUE, SUITE 1000  
NEW YORK, NEW YORK 10022-4802  
TELEPHONE (212) 906-1200  
FAX (212) 751-4864

ORANGE COUNTY OFFICE  
650 TOWN CENTER DRIVE, SUITE 2000  
COSTA MESA, CALIFORNIA 92626-1925  
TELEPHONE (714) 540-1235  
FAX (714) 755-8290

SAN DIEGO OFFICE  
701 "B" STREET, SUITE 2100  
SAN DIEGO, CALIFORNIA 92101-8197  
TELEPHONE (619) 236-1234  
FAX (619) 696-7419

SAN FRANCISCO OFFICE  
505 MONTGOMERY STREET, SUITE 1900  
SAN FRANCISCO, CALIFORNIA 94111-2562  
TELEPHONE (415) 391-0600  
FAX (415) 395-8095

FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF SECRETARY

RECEIVED

JUL 6 - 1995

EX PARTE OR LATE FILED

July 6, 1995

No. of Copies rec'd  
List A B C D E

024

LATHAM & WATKINS

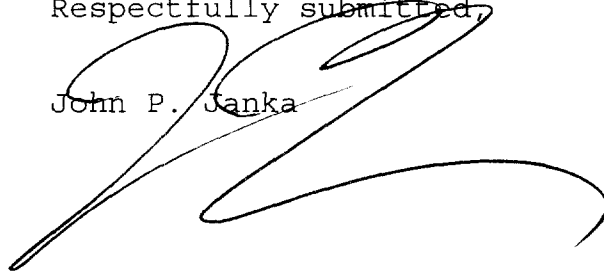
William F. Caton  
July 6, 1995  
Page 2

30.0 GHz part of the Ka band. Copies of this letter are being provided to the Commission representatives identified above.

Respectfully submitted,

John P. Janka

Enclosures

A large, stylized handwritten signature in black ink, appearing to be 'Janka', written over the typed name 'John P. Janka'.

# **SPACEWAY™ SATELLITE SYSTEM GROUND SEGMENT ARCHITECTURE**

**HUGHES  
COMMUNICATIONS**

3 JULY 1995

## **PRESENTATION TO THE FEDERAL COMMUNICATIONS COMMISSION**

**JULY 3, 1995**



# **NORTH AMERICAN SPACEWAY™ MARKETS**

**HUGHES  
COMMUNICATIONS**

3 JULY 1995

- **VIDEO PHONE AND TELECONFERENCING**
  - **INTERNET ACCESS / DATA NETWORKS**
  - **DISTANCE LEARNING**
  - **REGIONAL DIRECT TO HOME VIDEO**
  - **HOME SHOPPING**
- 



# SPACEWAY™ SYSTEM GROUND NETWORK

**HUGHES**  
**COMMUNICATIONS**

3 JULY 1995

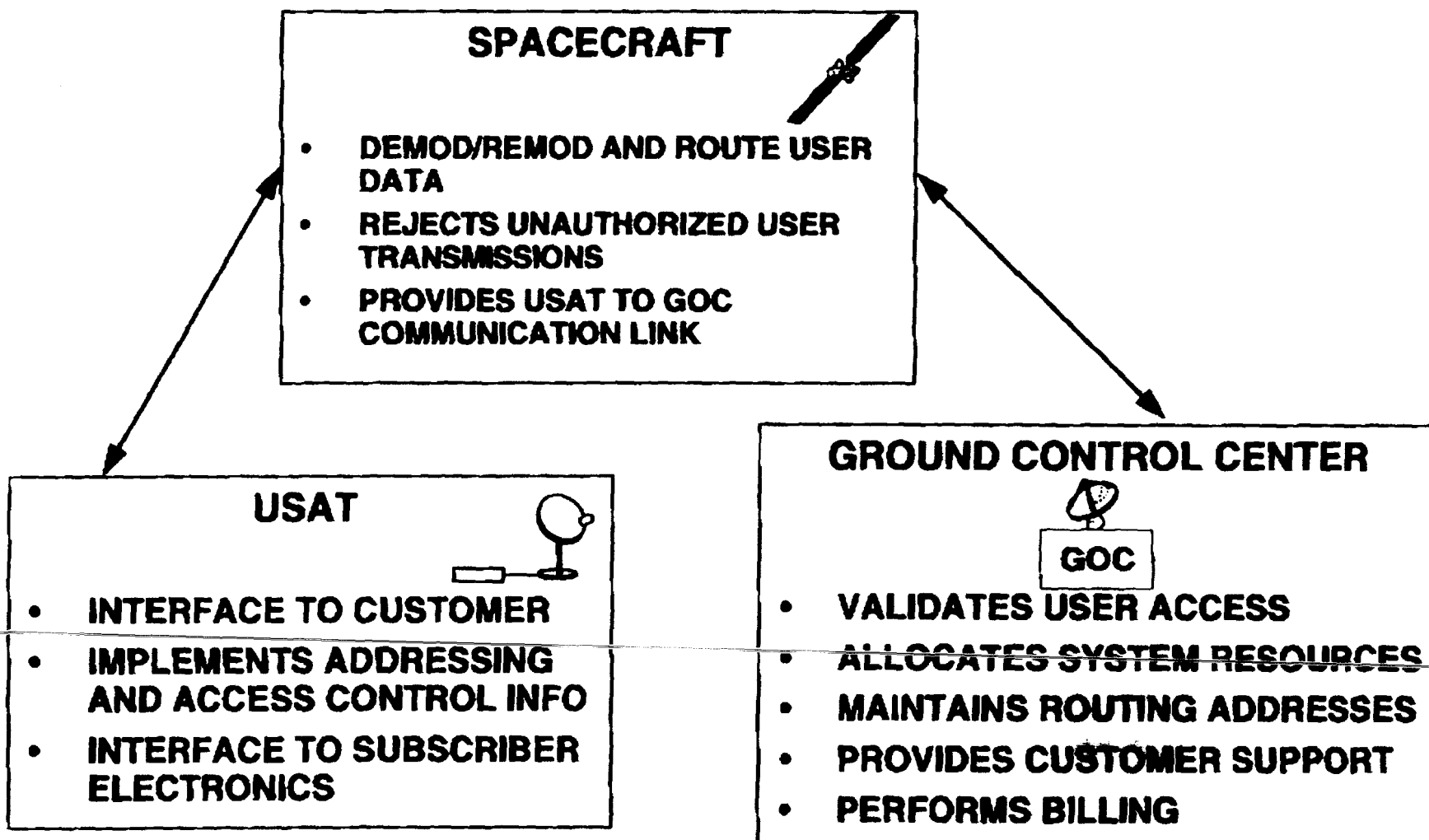
- **SPACEWAY™ DESIGN HINGES ON A UBIQUITOUS DEPLOYMENT OF ULTRA SMALL EARTH STATIONS THAT ACCESS THE FULL 1000 MHz OF Ka BAND CAPACITY**
- **EACH SPACEWAY™ EARTH STATION CAN CONNECT THROUGH THE SATELLITE TO ANY OTHER EARTH STATION POINTED AT THE SAME ORBITAL LOCATION**
  - **SYSTEM PROVIDES FULL MESH CONNECTIVITY OF ALL USERS**
  - **NO TERRESTRIAL EARTH STATION "HUBS" OR "GATEWAYS" ARE USED**
  - **NOT A TYPICAL VSAT SYSTEM WHICH EMPLOYS A SPOKE AND HUB DESIGN WITH LARGE GATEWAY(s) CONNECTING TO THE OUTLYING SMALL TERMINALS**
  - **THE SATELLITE'S ON BOARD PROCESSOR ACTS AS A "HUB" OR SWITCH IN THE SKY TO DYNAMICALLY ROUTE CALLS TO THE SYSTEM USERS**
- **SPACEWAY™ SYSTEM PROVIDES BANDWIDTH ON DEMAND INSTEAD OF REQUIRING DEDICATED CIRCUITS BETWEEN USERS**
- **SPACEWAY™ SUPPORTS CONNECTION TO THE PSTN BUT DOES NOT USE PSTN GATEWAYS**
  - **CONNECTION TO THE PSTN WILL OCCUR THROUGH THE SAME TYPES OF TERMINALS SOLD TO INDIVIDUAL USERS**



# SPACEWAY™ FUNCTIONAL DIAGRAM

**HUGHES**  
**COMMUNICATIONS**

3 JULY 1995



# SPACEWAY™ EARTH STATIONS

**HUGHES**  
**COMMUNICATIONS**

3 JULY 1995

- **SPACEWAY™ SUPPORTS A WIDE RANGE OF DATA RATES FROM BURSTY (POINT OF SALE) TO T1 AND HIGHER**
  - **PRIMARY MARKET WILL BE SUPPORTED THROUGH 66 CM DISHES**
    - **MAXIMIZES AFFORDABILITY AND MASS MARKETABILITY**
    - **SUPPORTS ALL DATA RATES UP TO 384 KBPS**
  - **USERS WHO DESIRE ACCESS TO HIGHER DATA RATES (T1) WILL BE ABLE TO USE OPTIONAL 1.2 M DISHES**
    - **LARGER, 2M DISHES WILL ONLY BE DEPLOYED TO UPLINK 6 MBPS VIDEO DISTRIBUTION SERVICE**
    - **THIS APPLICATION IS INTENDED ONLY FOR INTERNATIONAL MARKETS, NOT THE U.S. MARKET**
    - **LARGE TERMINALS MAY ALSO BE MADE AVAILABLE TO PROVIDE IMPROVED AVAILABILITY IN AREAS WHICH EXPERIENCE SIGNIFICANT RAIN FALL**
-

# **SPACEWAY™ SPOT BEAM DESIGN MAXIMIZES SYSTEM CAPACITY**

**HUGHES**  
**COMMUNICATIONS**

3 JULY 1995

- **SPACEWAY™ IS DIFFERENT THAN A TYPICAL CONUS COVERAGE TRANSPONDER SATELLITE**
  - **24 DIFFERENT SPOT BEAM FOOTPRINTS PROVIDE COVERAGE OF ALL 50 STATES**
  - **EACH SPOT BEAM IS APPROXIMATELY 400 MILES IN DIAMETER AND PROVIDES 250 MHz OF CAPACITY**
  - **SPOT BEAM DESIGN PROVIDES HIGH G/T AND EIRP TO FACILITATE SMALL, LOW COST TERMINALS**
  - **COMBINED USE OF SPOT BEAMS FOR SPATIAL SEPARATION AND DUAL POLARIZATION PROVIDES 12X FREQUENCY RE-USE**
- **RESTRICTIONS ON THE USE OF 250 MHz WOULD EFFECTIVELY "CUT" A SPACEWAY™ SPACECRAFT CAPACITY BY ONE HALF**
  - **THE SPACEWAY™ SYSTEM DOES NOT EMPLOY LARGE GATEWAY TERMINALS**



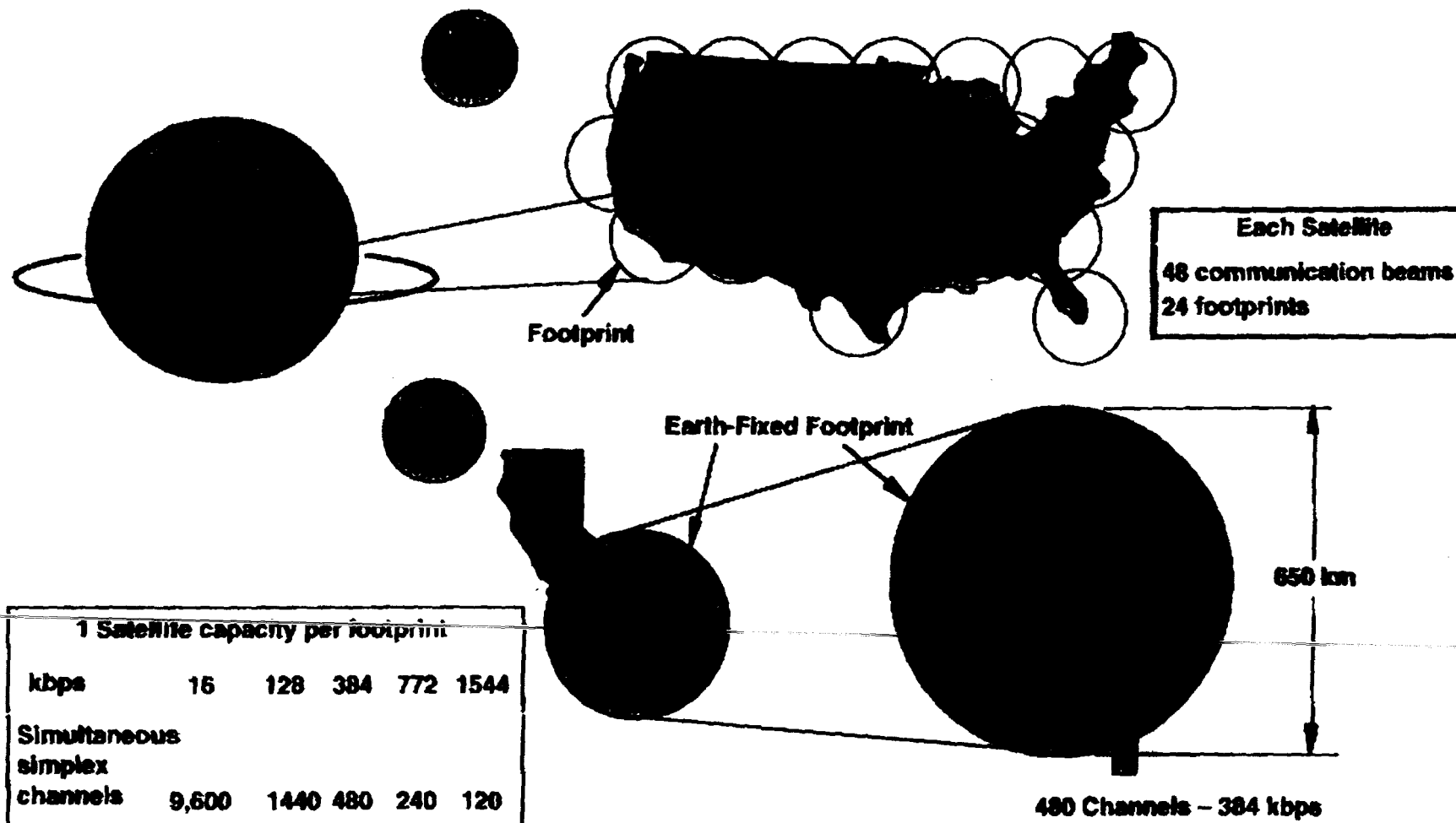


# SPACEWAY™

Spot Beam Technology Permits High Frequency Reuse and High System Capacity

**HUGHES**  
COMMUNICATIONS

11 January 1995



# CAPACITY & BUSINESS CASE FOR SPACEWAY™

**HUGHES**  
COMMUNICATIONS

3 JULY 1995

- **THE SPACEWAY™ CAPACITY AND BUSINESS CASE ARE DIRECTLY PROPORTIONAL TO THE AVAILABLE FREQUENCY BANDWIDTH**
    - ACCESS TO 1000 MHz BY ALL TERMINALS IS NECESSARY FOR A VIABLE BUSINESS
    - HIGH DATA RATE SERVICES CANNOT BE RESTRICTED TO A PORTION OF THE REQUESTED 1000 MHz
      - + FUNDAMENTALLY INCONSISTENT WITH SPOT BEAM DESIGN AND WOULD LIMIT CAPACITY FOR STANDARD (66 CM) TERMINALS IN HALF THE UNITED STATES
    - FREQUENCIES ARE NOT PREASSIGNED TO ANY GIVEN SERVICE, SUCH AS T1
    - FREQUENCIES ARE DYNAMICALLY RE-ASSIGNED TO MAXIMIZE OVERALL SYSTEM CAPACITY
  - **LIMITING CAPACITY AVAILABLE FOR 66 CM TERMINALS MAKES SPACEWAY™ BUSINESS CASE UNWORKABLE BY SIGNIFICANTLY REDUCING PROJECTED REVENUES**
- 

6:45 No.002 P.10

JUL 04'95

ID:310-364-4841

HUGHES COMM. - SPACEWAY

# SUMMARY & CONCLUSIONS

**HUGHES**  
**COMMUNICATIONS**

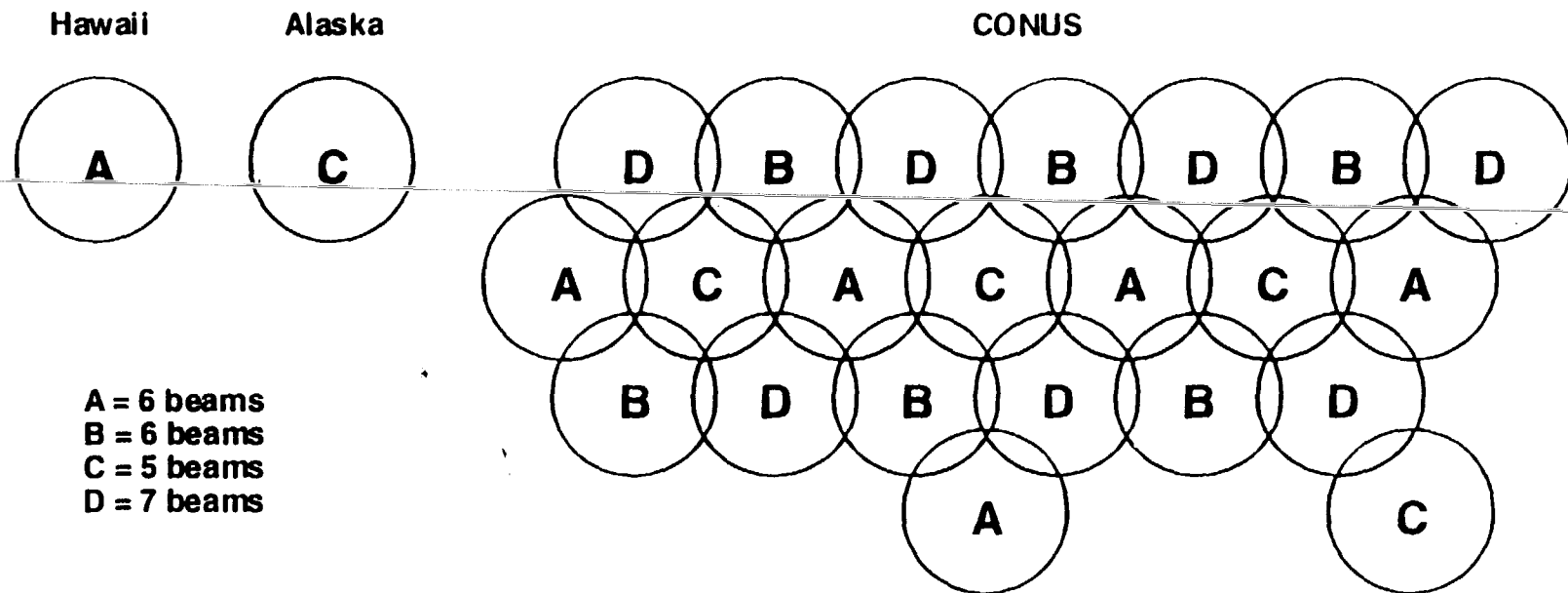
3 JULY 1995

- **SPACEWAY™ BUSINESS CASE AND ARCHITECTURE REQUIRE ACCESS TO THE FULL 1000 MHz BY ALL SPACEWAY™ TERMINALS (66CM AND LARGER)**
- **SPACEWAY™ ARCHITECTURE IN THE UNITED STATES DOES NOT INCLUDE GATEWAYS INTO THE PSTN**
  - **PSTN CONNECTIVITY IS PROVIDED AT THE LOCAL EXCHANGE BY NORMAL SPACEWAY™ (SMALL) TERMINALS**
- **SPACEWAY™ PROVIDES FULL MESH CONNECTIVITY AMONG ALL USERS AND ALL SIZES OF TERMINALS**
  - **ALL ROUTING IS PERFORMED ON THE SPACECRAFT**
  - **NO TERRESTRIAL HUBS ARE REQUIRED**

**RESTRICTING 250 MHz OF THE REQUESTED 1000 MHz TO ACCESS BY GATEWAYS IS UNTENABLE FOR THE SPACEWAY™ UNITED STATES MARKET AND SUPPORTING ARCHITECTURE**

# Domestic System Beam Lay-down

**HUGHES  
SPACE AND  
COMMUNICATIONS**  
A unit of Hughes Aircraft Company



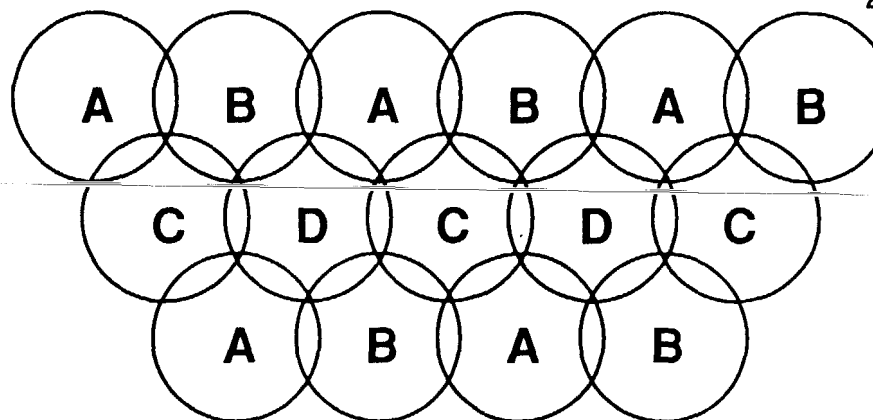
- **Spot beam coverage**
  - 22 beams for CONUS
  - 1 beam for Alaska
  - 1 beam for Hawaii
- **Each beam has two polarizations: RHCP and LHCP**
- **Frequency reuse pattern provides full diagonal distance from beam with same frequency and polarization**

# SPACEWAY™ Frequency Plan

**UGHES**  
COMMUNICATIONS

2 MAY 1995

**Beam Pattern**



**Satellite A**

Uplink frequency [GHz]	29.500 - 29.625		29.625 - 29.750		29.750 - 29.875		29.875 - 30.000	
Downlink frequency [GHz]	19.700 - 19.825		19.825 - 19.950		19.950 - 20.075		20.075 - 20.200	
Polarization	H	V	H	V	H	V	H	V
Beam family	A	B	B	C	C	D	D	A

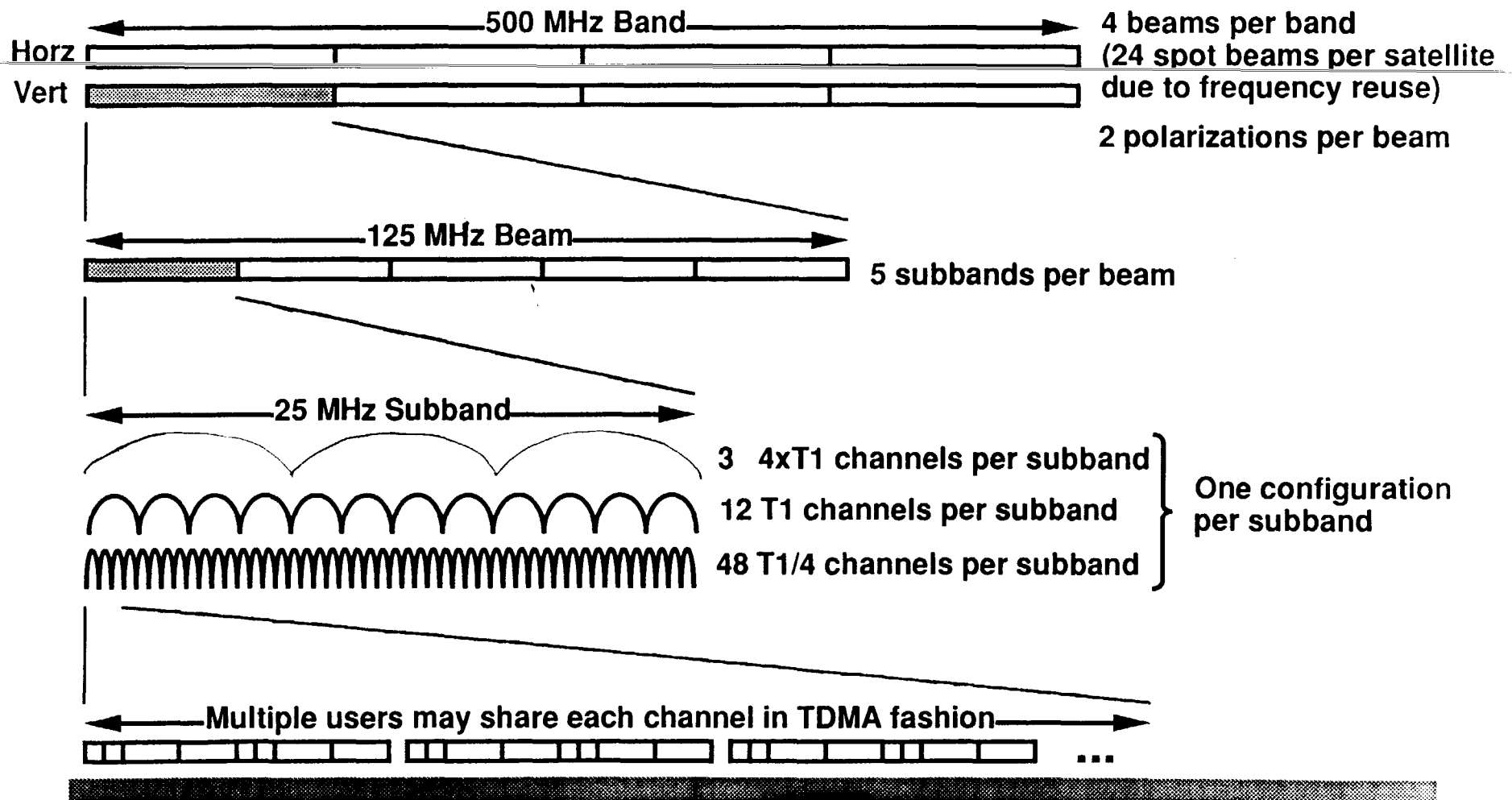
**Satellite B**

Uplink frequency [GHz]	29.000 - 29.125		29.125 - 29.250		29.250 - 29.375		29.375 - 29.500	
Downlink frequency [GHz]	19.200 - 19.325		19.325 - 19.450		19.450 - 19.575		19.575 - 19.700	
Polarization	H	V	H	V	H	V	H	V
Beam family	A	B	B	C	C	D	D	A

# Uplink Frequency Plan

**HUGHES**  
**COMMUNICATIONS**

2 MAY 1995



# SPACEWAY™ SYSTEM CAPACITY

HUGHES  
COMMUNICATIONS

2 MAY 1995

## EACH SATELLITE HAS 48 BEAMS

- 24 COVERAGE AREAS
- 2 POLARIZATIONS PER COVERAGE AREA
- 500 MHz OF SPECTRUM PER SATELLITE
- 125 MHz PER BEAM

## EACH BEAM HAS 240 384 KBPS CHANNELS

## 11,520 CHANNELS (at 384 KBPS) PER SATELLITE

- $240 \frac{\text{channels}}{\text{beam}} \times 48 \frac{\text{beams}}{\text{satellite}} = 11,520 \frac{\text{channels}}{\text{satellite}}$

## 230,400 CHANNELS (at 16 KBPS) PER SATELLITE

- $11,520 \frac{\text{channels}}{\text{beam}} \times 20 \frac{16 \text{ kbps slots}}{\text{TDMA frame}} = 230,400 \frac{\text{channels}}{\text{satellite}}$  [115,200 full-duplex]

# CHANNELS PER SATELLITE

**HUGHES**  
COMMUNICATIONS

2 MAY 1995

<u>Date Rate</u> <u>(kbps)</u>	<u>TDMA</u> <u>Slots /</u> <u>FDMA</u> <u>Channel</u>	<u>FDMA</u> <u>Channels /</u> <u>Subband</u>	<u>FDMA</u> <u>Channels</u> <u>/ Beam</u>	<u>FDMA</u> <u>Channels /</u> <u>Spacecraft</u>	<u>Simplex</u> <u>Channels /</u> <u>Spacecraft</u>	<u>Duplex</u> <u>Channels /</u> <u>Spacecraft</u>
8	32	48	240	11520	368640	184320
16	20	48	240	11520	230400	115200
32	11	48	240	11520	126720	63360
64	5	48	240	11520	57600	28800
384	1	48	240	11520	11520	5760
1544	1	12	60	2880	2880	1440
6176	1	3	15	720	720	360



# CAPACITY OPTIONS

**HUGHES**  
**COMMUNICATIONS**

2 MAY 1995

Date Rate (kbps)	User Channels / Beam (simplex)	User Channels / Satellite (simplex)	Comment
8	7680	368640	• Divide by 2 for duplex
16	4800	230400	• Divide by 2 for duplex
64	1200	57600	• Divide by 2 for duplex
128	720	34560	• Divide by 2 for duplex
384	240	11520	• Divide by 2 for duplex
1544	60	2880	• Nominal T1 rate
3088	30	1440	• DBS quality for movies (off-line compression)
6176	15	720	• DBS quality for live sports

**Presentation to the  
Federal Communications Commission**

---

**28 GHz Resolution**

**Hughes Communications Galaxy, Inc.**

**July 6, 1995**

## **PROMPT RESOLUTION OF THE DOMESTIC 28 GHZ PROCEEDING IS CRITICAL TO HUGHES BUSINESS PLANS**

- **Hughes is actively pursuing international implementation of SPACEWAY proposal**
- **Resolution of 28 GHz proceeding requires reasonable burdens borne by all parties**
- **Current staff proposal hinges on sharing between GSO and non-GSO feeder links**
  - **Hughes has worked for over 6 months on this sharing issue**
    - **non-GSOs have rejected HC proposal as unworkable**
  - **Staff proposal for GSO/non-GSO sharing will prevent implementation of Hughes Spaceway system as proposed**
    - **restricting 250 MHz (29.1-29.25) to non-VSATs is fundamentally inconsistent with Spaceway system design**
- **SPACEWAY business plan is not feasible without access to 1000 MHz of spectrum by small antennas**

# **HUGHES CONCERNS WITH CURRENT STAFF PROPOSAL**

## **Primary Issue**

- **No feasible solution to GSO/non-GSO sharing problem except for "reverse band working"**
  - **reverse band working possible at 19.4--19.7 GHz or 18.4-18.6 GHz**
  - **consistent with basic framework of staff proposal for 27.5--29.5 GHz**

## **Secondary Issues**

- **Resolution of Motorola downlink band concerns through "non-standard" uplink/downlink band pairing**
- **Restrictive power limits at 18.6-18.8 GHz**
- **LMDS grandfathering at 27.35--27.5 GHz during period when GSO systems are likely to be in commercial operation (1998--on)**

## **28 GHz RESOLUTION SUMMARY AND RECOMMENDATION**

---

- **Revised FCC Staff proposal prevents implementation of SPACEWAY in U.S. market**
- **Hughes proposed solution spreads burden of segmentation plan and allows all proposed systems to operate**

(1)

Original FCC Staff Proposal  
(Including "Natural" Paired Downlinks)

UPLINK	SERVICES	DOWNLINK
27.5		17.7
28.35 or 28.45	LOCAL MULTIPOINT DISTRIBUTION SERVICE Fixed-Satellite Service (non-GSO and GSO)	18.55 or 18.65
	FIXED-SATELLITE SERVICE (non-GSO) Fixed-Satellite Service (GSO)	
	LMS grandfathered at 28.35-28.5 for 5 years before non-GSO system likely to operate	
28.85		19.05
	FIXED-SATELLITE SERVICE (GSO) Fixed-Satellite Service (non-GSO)	
29.1		19.3
	FIXED-SATELLITE SERVICE (non-GSO MSS Feeder Links) LOCAL MULTIPOINT DISTRIBUTION SERVICE	
29.25		19.45
	FIXED-SATELLITE SERVICE (GSO) FIXED-SATELLITE SERVICE (non-GSO MSS Feeder Links)	
29.5		19.7
	FIXED-SATELLITE SERVICE (GSO) Fixed-Satellite Service (non-GSO)	
30.0		20.2

Uppercase = Primary  
Lowercase = Secondary

PRIMARY HUGHES ISSUE:

No feasible solution for GSO/non-GSO sharing at 29.25-  
29.5/19.45-19.7 other than "reverse band working" by  
non-GSO systems in the downlink band

(2)

Revised FCC Staff Proposal  
(Including "Natural" Paired Downlinks)

UPLINK	SERVICES	DOWNLINK
27.5 —	LOCAL MULTIPOINT DISTRIBUTION SERVICE Fixed-Satellite Service (non-GSO and GSO)	— 17.7
28.35 —	FIXED-SATELLITE SERVICE (GSO) Fixed-Satellite Service (non-GSO)	— 18.55
28.6 —	FIXED-SATELLITE SERVICE (non-GSO) Fixed-Satellite Service (GSO)	— 18.8
29.1 —	FIXED-SATELLITE SERVICE (non-GSO MSS Feeder Links) LOCAL MULTIPOINT DISTRIBUTION SERVICE	— 19.3
29.25 —	FIXED-SATELLITE SERVICE (GSO) FIXED-SATELLITE SERVICE (non-GSO MSS Feeder Links)	— 19.45
29.5 —	FIXED-SATELLITE SERVICE (GSO) Fixed-Satellite Service (non-GSO)	— 19.7
30.0 —		— 20.2

Uppercase = Primary  
Lowercase = Secondary

**PRIMARY HUGHES ISSUES:**

- (1) No feasible solution for GSO/non-GSO sharing at 29.25–29.5/19.45–19.7 other than "reverse band working" by non-GSO systems in the downlink band
- (2) Grandfathering LMDS at 28.35–28.5 GHz during period when GSO systems likely to be in operation in that band (1998-on)
- (3) Restrictive power limits at 18.6–18.8 GHz

(3)

Proposed Solution to Hughes Issues  
Including Non-Standard Paired Downlinks

SERVICES		
27.5	LOCAL MULTIPOINT DISTRIBUTION SERVICE Fixed-Satellite Service (non-GSO and GSO)	17.7
28.35	FIXED-SATELLITE SERVICE (GSO) Fixed-Satellite Service (non-GSO)	18.55
28.6	FIXED-SATELLITE SERVICE (non-GSO) Fixed-Satellite Service (GSO)	18.8
29.1	FIXED-SATELLITE SERVICE (non-GSO MSS Feeder Links) (Motorola) LOCAL MULTIPOINT DISTRIBUTION SERVICE	19.3
29.1		19.425
29.25	FIXED-SATELLITE SERVICE (GSO)  Non-GSO MSS feeder links (TRW) operate only in the reverse direction at either 18.4-18.6 or 19.4-19.7 on a primary basis in that direction	19.575 19.3 to 19.425 and 19.575 to
29.5	FIXED-SATELLITE SERVICE (GSO) Fixed-Satellite Service (non-GSO)	19.7
30.0		20.2

Uppercase = Primary  
Lowercase = Secondary